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## Translation urgency in our climate-challenged times: co-producing geographical knowledge on El Niño in Peru

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### ABSTRACT

This paper makes a case for revisiting the understandings of translation to enhance the co-production of geographical knowledge on climate change. Specifically, it offers insights about the potential role that schoolteachers and students can have as knowledge producers in relation to climate change by drawing on a case study of collaborative research on El Niño in Sechura, northern Peru. We call for researchers to pay greater attention to how co-production can be achieved through the integration of research agendas and practice with curricula development and innovation in school education. We contribute to work on how a generational shift in understanding about climate adaptation can be achieved through exploring communities' knowledge of the lesser-known opportunities of the El Niño phenomenon in northern desert regions. We conclude by arguing that revisiting how geography engages in and with translation is an urgent priority in climate-challenged times.

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Co-production of knowledge; Peru; El Niño phenomenon; climate change; geographical education; translation

## Introduction

When the world came to Scotland for COP 26 in November 2021 real-time translation was of central importance in communicating the urgency of the climate change message. As Jianjun Chena a United Nations Chinese language translator explained: 'COP 26 was both an exciting and a stressful period for translators. Sometimes we read a news story about the negotiations, and soon enough it was reflected in our documents; at other times, our translations were directly cited by the press' (Chena, 2021, n.p.). COP 26 took place as the world was beginning to emerge from the COVID-19 pandemic. The pandemic taught us many lessons about how to teach and do research in changed circumstances. It provoked new challenges for academic geography (Castree et al., 2020) and in the social sciences and arts more widely stimulated a wave of

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methodological innovation (Nind et al., 2021; 2022) as qualitative researchers had to ‘think again’ about how to do interviews (Singleton, 2021) and oral histories (DRI, 2020) in restricted circumstances. The COVID-19 pandemic itself also became a research topic as scholars, teachers and museums quickly set about capturing how it was experienced in different places, enrolling students and the wider public in data collection projects (Anderson & DeRiemer, 2021; Ennis, 2021).

This paper tells the story of how research on El Niño in Sechura, northern Peru, based on a collaboration between British and Peruvian Universities, Peruvian NGOs, Municipal authorities, the School Board, and a local School,<sup>1</sup> came to recognise the potential role that teachers and students can have as knowledge producers about climate change. The need to respond to the demands of the launch of a national education online learning COVID-19 pandemic response program ‘I work at home’ (Ministerio de Educación, 2020) and the challenges of carrying out qualitative research during the COVID-19 pandemic both brought issues of translation and co-production into high relief. Together they took our attempts as researchers to contribute to geographical knowledge about El Niño in the context of climate challenges in new directions (Laurie et al., forthcoming). Reflecting on this shared experience, we respond to the call for researchers to make visible the flows of expertise and identify possibilities in relation to the co-production of knowledge on climate change (Vincent, 2022; Vincent et al., 2020). We make a case for researchers to pay greater attention to how co-production can be achieved by intertwining research agendas and practice with curricula development and innovation in school education. In so doing, the aim is to contribute to a generational shift in understanding about how climate adaptation can be achieved. We argue that revisiting how geography engages in and with translation is an essential step on this journey.

## Translating climate-challenged worlds

There is an established tradition in geography of researchers addressing the significance and challenges of translation in their research. In the late-1980s and early-1990s anglophone feminist geographers working in different language contexts, prioritised geographical knowledge production about and with research subjects and shaped the debate in this field in important ways. A key intervention that has influenced subsequent work on ‘worlding geographies’ (Müller, 2021) is an *Area* paper by Fiona Smith (1996) which drew on her experience of working with women’s social movements in Eastern Germany around the time of unification (Laurie et al., 1999). Her paper sets out a strategy of ‘research between languages’ (Smith, 1996, p. 160), which considers issues of translation and interpretation in both research and writing. In another geographical setting, Janet Townsend’s *Women’s Voices from the Rainforest* drew together co-authors from Mexico with work published in both English and Spanish (Townsend, 1995; Townsend et al., 1994). She and her collaborators tackled head-on the dilemmas of translation and representation in discussing their approach to working with life history methodologies (Frenk, 1995).

In an extension to the discussion of translation in geography, the experience of co-production and translation in our work on El Niño in Peru draws directly on this feminist tradition of working with the subjects of research. It engages with the recent interest in the humanities in ‘terratranslation’, ‘the translation of the idioms of the Earth, between

the human and non-human' (Cronin, 2022, p. 11) and the role that it can play in climate-challenged times. We bring the legacies of both sets of work into dialogue with what translation can mean for educational curricula. Specifically, we focus on points of translation between research, teaching and lived experiences relating to climate change. We address how these intersections can be productively used to address student learning competencies with intergeneration knowledge about resilient livelihoods during environmentally and socially challenging moments. We do so by expounding one moment of translation and dialogue that occurred mid-way through our research on El Niño and desert food systems in Sechura, Peru,<sup>2</sup> when field-based research plans were interrupted by the COVID-19 pandemic. The substantive geographical focus of the research is on how farming and fishing practice in communities in the Sechura desert region of northern Peru respond to this phenomenon in the context of climate change. One of the research project's objectives is to mitigate the loss of knowledge over time, acknowledging the value of the expertise that exists within desert communities over generations with regards to both El Niño and climate change.

### ***Online dialogue: COVID and translation urgency***

The online dialogue we draw attention to took place between UK-based researchers (Laurie and Bell), state educators in Peru (Cornejo and Puestas) and England (Healy) and practitioners from the Peruvian NGO PRISMA (Calle, Carmen and Valdez) in the same month that COP 26 participants were meeting online and in-person in Scotland. All were researchers or formal collaborators on the El Niño project and are co-authors of this paper.

When COP 26 was occupying headlines in November 2021, international media sources were also highlighting the devastating impact that COVID-19 had unleashed in the country (NPR, 2021). Coverage cited new analysis from June 2021 of the COVID-19 per capita death rate in Peru, when reassessments of data tripled the death toll and resulted in Peru having the highest rate in the world (Dyer, 2021). That same month, November 2021, the second lock-down in England was announced (Institute for Government, 2021), the Scottish Government moved Fife to protection level 3<sup>3</sup> and imposed restrictions on travel outside the local area (Scottish Parliament, 2023). The timing and context for this online dialogue between researchers and collaborators is therefore significant, it occurred at a time of heightened awareness about the on-going effects of the COVID-19 pandemic, including on the learning experience of students (Schleicher, 2020). It also built directly from intensive online communication between research team members and collaborators which began in March 2020 when lockdown prevented in-person visits and fieldwork.

Peru went into a first period of national lockdown on 15th March 2020 until the end of June 2020. Following this, restriction criteria varied by region, ranging from full lockdown to lighter curfew and travel restrictions, which affected Sechura. Return to more established patterns of work among the Peruvian partners and collaborators was uneven and the majority remained working from home throughout 2021 and into 2022. During this period, universities and schools were closed to in-person teaching. By June 2020, the team had developed a strategy involving the distribution of computer tablets (Calle & Laurie, 2020) to enable students in

secondary education to carry out intergenerational oral histories themselves, facilitated by online classes in storytelling.

Translation was a key feature of all exchanges within the team and with wider project collaborators and audiences. We developed a new-found respect for translation professionals like Jianjun Chena above, as we experimented with Google Translate and started to use the rapidly developing translation-transcription tools on Teams and Zoom platforms. For important meetings and dialogues, we contracted a simultaneous translator. The curriculum dialogue we refer to below was produced in this way. The meeting was transcribed in Spanish and translated to produce a full text in English. In writing this article, the text itself has been treated almost like qualitative 'data' that we 'coded' informally. In a review of qualitative methods for *Progress in Human Geography*, Russell Hitchings and Alan Latham (2021, p. 392) call for greater reflection on

how methods are presented, how novel strategies and fieldwork failures are discussed, what is said about how others might take our findings forward, and the phrases that we use to convey our essential aim in writing papers that consider the results of qualitative research.

Elsewhere we elaborate on how we address these concerns in our interdisciplinary research combining physical and human geography methods to examine El Niño as a phenomenon of opportunity in the Sechura desert in the context of climate change (Laurie et al., [forthcoming](#)). Reflecting on our curriculum dialogue specifically here, we argue that this is now an urgent agenda with respect to translation in co-produced research as researchers need to find ways to respond to Müller's (2021, p. 1448) critique of 'linguistic privilege in geographical knowledge production' in more serious ways.

In selecting the quotations and making summaries of discussion points from our joint dialogue in November 2021, we have purposely not identified who is speaking or where they are from (country or institution). The intention behind this decision is to reflect the emphasis that we wish to place on co-production, rather than exploring any differences between the constitutive parts that make it up. The summaries and syntheses are the products of our joint discussions across Spanish and English and across academic, schools and NGO languages, and so identifying individual speakers in the direct quotations would give greater importance to this one voice and detract from the consensus that we had built over time, at this point after more than 18 months of online communication.<sup>4</sup> Reflecting critically on how to present collective voices and co-produced outputs is something that the feminist school in Geography firmly established several decades ago (WGSG, 1984, 1997) and is exemplified by Townsend et al.'s (1995) discussion of life histories mentioned above. Nevertheless, this ongoing methodological contribution (see Scott, 2020 on narrative and feminist geography influences on understanding black community spaces) has not been as widely profiled as other traditions in human geography. There is little explicit engagement with the feminist legacies in qualitative research in Hitchings and Latham's (2019, 2021) *Progress in Human Geography* reviews, for example.<sup>5</sup>

While both Spanish and English languages were used throughout the El Niño project collaboration, the key translation lessons learned through the dialogue were not about the challenges of translating from one to the other but about differences in school official planned curricula and those that are enacted; about the further translation to a national online curriculum, and what that would require. Discussion included how it

could be adapted to geographical specificity whilst also being responsive to the geography of poverty, including digital divides. Translation was bound up in conversations about the shared and different needs of research and students and teachers in the virtual classroom, and in the detail of comparing a national curriculum context based on competencies with that of substantive subject knowledge-based curricula.

### **Curriculum engagement and building expertise about geographical space and environment**

Geographical education in schools generates the capacity to give attention to fundamental climate-related issues like climate resilience (Ruiz-Mallén et al., 2022). In addition, the complexities of climate change call for ‘an approach, which empowers children and young people to meaningfully engage with entanglements of climate fact, value, power, and concern across multiple scales and temporalities’ (Rousell & Cutter-Mackenzie-Knowles, 2020, p. 203). In Peru, geography is integrated within the broader subject of social studies. As with the Scottish Curriculum of Excellence (Scottish Government, 2009), the National Curriculum is constructed from a set of competencies. Each competence is directed by standards that students in the whole country must achieve (Ministerio de Educación, 2016). Teachers across different regions, provinces and schools can make contextual decisions about how this curriculum is enacted in classrooms. Through the Social Sciences curriculum in Peru, particularly competence 18 which focusses on ‘responsibly managing space and environment’, there is a substantial geographical focus requiring students to understand the relationships within and between human and physical geography (Ministerio de Educación, 2016). Teachers need to support students to manage various sources of information to understand geographic space and environment and analyse the impact of environmental problems on the lives of people. Given the dominance of disaster narratives about El Niño globally (Grove & Adamson, 2018) and the extent to which El Niño has been cast as a ‘disruptor of environmental and socioeconomic equilibrium both in ancient times and in modern-day Peru’ (Caramanica et al., 2020, p. 117), it is a pertinent topic to be taken up in curriculum development in areas deeply affected by the phenomenon.

### ***El Niño learning and curriculum alignment in Sechura***

El Niño is the warm phase of the El Niño-Southern Oscillation (ENSO) which is the main source of climate variability on the planet. El Niño generates cyclical heavy rainfall events capable of causing devastation in Peru as sea surface temperatures rise across the equatorial Pacific. In Sechura, the waters of the river Piura flow into the Sechura Desert creating a large body of water known as La Niña Lagoon during periods affected by El Niño events (Laurie et al., [forthcoming](#)). At its peak, the La Niña Lagoon grows to more than eight times the size of Scotland’s largest loch, Loch Lomond, and stretches 600km<sup>2</sup> across the desert. While much interest has focused on El Niño as a disaster, very little attention has been given to the opportunities these events can create for food systems and local livelihoods in the desert (Bell et al., [forthcoming](#)).

Localised geographical specificity is significant in determining whether El Niño represents an opportunity for agricultural productivity in desert food systems, including

in a bounded arid area like Sechura. For the driest areas and most marginalised communities in the desert it can be of great benefit, whereas for other wetter districts, including those with irrigated lands, flooding causes significant losses. Even in the most badly affected lands in the rural parts of the Sechura desert, however, bounce-back can occur relatively quickly.

At the time of the curricular dialogue significant insights had already been gleaned from the initial phase of the research project (see Laurie et al., [forthcoming](#)). Research indicated that sea fishers move to the temporary lagoons created in the desert when sea fishing and shell fishing decline because of El Niño. They use the same infrastructure (small fishing rafts and refrigerated lorries) and local neighbourhood and kinship networks to carry out fishing and access markets (Laurie & Mendo, 2022). Local residents, including farmers, also take up fishing opportunities. Bringing storytelling into the El Niño research project was a way to engage students in collecting information about these livelihoods in a context where the lagoons that form after an El Niño event can last up to five years before they dry out. The secondary-school aged students (78 in total<sup>6</sup>) started data collection three years after the last El Niño event (the El Niño Costero) hit northern Peru, creating wide-spread damage in the city of Piura (Laurie et al., [forthcoming](#); Martínez & Takahashi, 2017).

Relating the information that the students were collecting and the knowledge that they were starting to gain back to curricula competencies in Peru during the lockdown period with our research was key. It allowed all the stakeholders involved (researchers, state educators and NGO practitioners) to talk about the iterative nature of the emphasis that they later placed on strengthening competencies in relation to oral expression and text-based projects:

One of the things we are also strengthening is the topic of narration and strengthening competencies in oral expression and text production, because we realised in phase 1 of the project that there were significant limitations at that level – how [students] communicate and express themselves – there being such vast knowledge about community resilience and adaptation with regards to the El Niño phenomenon. (Online dialogue, March 2020)

This focus on competencies was tied closely to the substantive content by acknowledging the extensive knowledge about community resilience and adaptation in relation to the El Niño phenomenon that could be community-generated and expressed by the students. Students shared this information in a variety of ways, including in videos that they curated from the story-telling methodology used to interview their parents and grandparents about their farming and fishing practices under El Niño conditions (see Bell et al., [forthcoming](#)). In this way, they were engaging in terratranslation, bringing together stories of the human and non-human worlds associated with El Niño. As the following quotation from the dialogue shows, the oral histories help to ensure that knowledge about these interconnections is not lost over time by the communities who are experiencing the losses and opportunities that El Niño can bring, including in the context of climate change:

One of the project's main objectives is the theme of mitigating the loss of knowledges over time, the knowledges that are deposited in the community with regards to the experience of the El Niño phenomenon and climate change. So, this experience is working with all of the sectors of the educational community, including family parents, teachers, students – the main voice that we want to hear. (Online dialogue, March 2020)

Levine Hampton (2022, p. 468) argues that ‘[o]ral history methodology is uniquely well placed to capture both the emotionality and spatiality of historical narrative.’ In prioritising the voice of the educational community across its breadth, the emphasis on collaboration in our research seeks to add value to the curriculum through foregrounding the emotions, experiences and needs of the communities living with this phenomenon. In so doing, it is contributing to the diversity of views in relation to what constitutes ‘hazards’ by questioning homogenising disaster narratives around El Niño that can work to obscure geographically distinct experiences. By bringing this focus into school classrooms in Sechura, the locally generated knowledge is providing avenues for the co-production of the curriculum and underscores the dynamic capacities of a competencies approach in Peru.

### ***Creating intergenerational expertise: placing the family unit back in school***

Generating geographical knowledge on El Niño in Peru under lockdown relied on students developing new digital and audio-visual skills:

We are strengthening conditions and competencies for the management of digital tools, such as recording videos, uploading them on Drive platforms, anything to do with digital competencies ... as well as audiovisual language and text narration. (Online dialogue, March 2020)

These tools also served for wider life during the pandemic. ‘Getting online’ and having the hardware, infrastructure, technical support and classes from teachers to show students how to do so in this geographically marginalised, and otherwise digitally poor, part of Peru also supported the wider household and family unit. Siblings and parents saw what could potentially be accessed and achieved with the computer tablets.<sup>7</sup>

At the same time, parents and grandparents also played an important role in supporting students in recording the El Niño experiences of their elders, correcting questions in oral history interviews and advising on what and where to film videos (Bell et al., *forthcoming*). In this way, when the pandemic turned the home into both workplace and classroom, communicating geographical knowledge on El Niño became an intergenerational task. Midway through the project when the team paused for this dialogue, they noted that families were starting to become learning units and sites of potential empowerment and capacity building, as summarised in the dialogue’s mid-way reflection on findings in [Figure 1](#).

Students express themselves more fluently because of their participation in the research. They have developed new ICT skills, incorporating them into their personal learning process via the oral histories they generated about the impacts of El Niño in their community.

Families have come to recognise that as a unit they are able to manage the effects of El Niño in their community in a resilient and timely manner. They are producing learning that can be deployed to help them make sense of other global crises like climate change and pandemics.

Families as units have become active participants in the teaching-learning process by providing sustained evidence of how they manage climate change over time. Their experience is being included as a meaningful learning process in curricular programming in relevant school subject areas.

**Figure 1.** Family unit learning outcomes.



By working together on storytelling about the opportunities that the El Niño rains can bring to their communities, it could be argued that family units became proto ‘action learning sets’, a participative problem-solving methodology promoted by the NGO sector.<sup>8</sup> However, translating the familial ties that supported storytelling during the pandemic into NGO language fails to capture nuanced arguments about the importance of oral history methodologies in revealing stories of communities that have historically been marginalised in dominant accounts of rural livelihoods. Writing about Black Geographies, for example, Darius Scott (2020, p. 984, our emphasis), argues that ‘intergenerational relations and the narratives they mobilise are *critical* to the *very existence* of *some* communities.’ Similar to the way in which the retelling of how communities in the Sechura desert have managed El Niño helps lay claim to rural space, Scott (2020) shows how intergeneration narratives cement community knowledge and understanding about how longstanding black communities could establish themselves in rural North Carolina, USA. The concern for the loss of knowledge expressed in research in both settings is similar. In the case of Sechura within the wider national setting where an El Niño disaster narrative dominates (Bell et al., [forthcoming](#); Laurie et al., [forthcoming](#)), it addresses the ways in which some marginal populations can assert that in their context it also provides opportunities.

### **Applying learning and opening up possibilities for co-production to contribute to geographical education**

The research underpinning this article is an attempt to mitigate the loss of northern desert-based knowledge about the El Niño phenomenon through a collaborative research process. The research partnership with PRISMA and the Sechura School Board amplified the reach of the research findings at a regional and national scale. The experience was scaled up through teacher workshops across the Sechura school board area, which at the point when lockdown began in Peru comprised 154 schools with 21,059 registered students. A total of 102 teachers from the curriculum subject areas of social science, maths, science and technology, education for work and art and culture participated in these training sessions, and in 2022 the collaboration and research partnership was recognised for its contribution to excellence in education by the regional government of Piura. The collective experience and co-produced curriculum innovation also achieved a high profile nationally in Peru through the award of significant prizes. These included the National Innovation Projects Contest held by the National Education Development Programme of the Ministry of Education (FONDEP).<sup>9</sup> The second stage of the project<sup>10</sup> was certified as ‘Good Practices in Public Management’ in the category Promotion of Culture and Identity by the highly prestigious national *Ciudadanos al Día* awards.<sup>11</sup> The reach of the learning generated from this corner of the Peruvian desert was therefore impressive. A key element in this success is the approach followed by the NGO PRISMA. Their mission is to work directly with government institutions, not separately from them. In this way, research objectives and outcomes were able to engage with, and where appropriate, align with those of government institutions and agencies (Municipal and District Authorities and the Sechura School Board) through ongoing dialogue. Research was able to respond in an agile way to the changing circumstances, including on the ground during the pandemic. Activities were programmed to fit in with annual school work

cycles to ensure that findings fed into successive rounds of planning and activities became integrated into work plans at all levels. Partnership working opened-up opportunities for wider dissemination through success in the government sponsored prizes that raised the profile of the research team and collaborators and helped target the findings and outcomes more effectively to the relevant stakeholders and sectors.

The amplification of learning was purposefully not confined only to Peru, however, but rather reflects an understanding of terratranslation that rests on-and-in a relational geography exemplified by the emphasis on international curriculum dialogue. The materials co-produced by the students, teachers, school board, parents and research team formed the basis of an extensive education resource on the geographically specific opportunities generated by El Niño, hosted by the UK's Royal Geographical Society for teachers of geography.<sup>12</sup> This resource, available in English and Spanish, addresses 'an absence of curricular material about Peru and in relation to locally generated knowledge about climate resilience' (Healy et al., 2023, p. 69). Significantly, the resource allows for teachers and students to engage with how knowledge about El Niño is produced, where and by whom and is also intended to prompt further curriculum reflection in geography around global climate change (Healy et al., 2023; RGS, 2022).

Since its launch in 2022, the resource has deepened its curriculum engagement by broadening its reach in national curriculum terms as well as opening-up dialogue with cross-cutting audiences in Education for Sustainable Development. As part of an in-person visit by PRISMA colleagues (authors on this paper: Carmen and Valdez) to the University of St Andrews in May 2023, the resource was the focus of discussions with the Royal Scottish Geographical Society's Education Committee. Conversation addressed how the resource could be utilised within the context of the Scottish Curriculum for Excellence. In this setting, and in a second workshop 'Learning in a changing climate a Peruvian-Scottish Exchange', hosted by Learning for Sustainability Scotland, cross-national discussion focused on shared concerns about the challenges of setting assessments and monitoring students' competency achievements. Following this visit, in preparation for the imminent arrival of what is being predicted to be a strong El Niño in northern Peru from December 2023 onwards (DiLiberto, 2023), a new dimension has been added to the research-teaching collaboration.<sup>13</sup> One element of this engagement focuses on the new species of fish that appear in the La Niña lagoon after an El Niño event. Linked directly to the Peruvian school curriculum subject area of science and technology, it addresses the competency 'inquiry through scientific methods to build knowledge' and seeks to develop students' specific skills in 'problematizing situations', 'designing research strategies' and 'generating and registering data' (Ministerio de Educación, 2016). To build these skills, classroom in-person teaching sessions have supported skills-based sessions online, delivered by St Andrews staff. They have taught students how to build and use an ichthyometre to measure fish size and how to access satellite imagery to geotag the locations of their field-based data collection. In the field, students identify new species by their common name and then subsequently carryout online research to find out their scientific ones.

Reflection on these diverse exchange experiences about El Niño livelihoods invites future consideration of the value of cross-national collaborations online and in-person. It highlights the future potential value of building educational competencies

that can agilely respond to anticipated as well as unexpected events associated with climate change.

## Conclusion

In geography and geography education, one might expect we would naturally be curious to know how knowledge production and (re)production in academic disciplines and school subjects varies across countries. The ‘Geography in the World’ initiative in *Transactions of the Institute of British Geographers* (McFarlane, 2022) appears to represent recent attempts to engage with what geography looks like across jurisdictions. The Commission of Geographical Education of the International Geographical Union’s Charter on Geographical Education (CGE, 2016) has held a long-standing focus on international co-operation for geography education, while geography educators have examined how geography is represented in national curriculum across different contexts (e.g. Brooks et al., 2017). The collaborative research experience reported upon in this paper contributes to these debates by understanding how curricula are enacted in practice across contexts, and showing where there is greater potential for co-production to contribute to geographical education through translation between research, teaching and lived experiences. It makes a contribution in three specific ways. First, the material produced by the Sechura school students – the videos, intergenerational interviews, graphic archive and outputs from on-going workshops delivered online and internationally – provide rich insights into the ways in which a curriculum can be enacted between teachers and students, located within specific communities of educators and families. Second, as cultural products themselves, these rich and diverse outputs provide textured and nuanced examples of terratranslation that reach beyond the usual findings and audiences of academic research. Third, they have the potential both to enliven and to authenticate the stories that are told in development geography teaching across all levels of education. Such a co-produced approach towards generating teaching resources, we would suggest, has within it the potential to reverse historical flows of knowledge and expertise between teacher, student and researcher. Arguably, it also has the potential to disrupt the colonial discourses that Julie Cupples and Ramón Grosfoguel (2018) and Christine Winter (2018) valuably show persist in different ways in the teaching of global development in universities and schools.

In research terms, methodologically our paper draws attention to one (pedagogic) way in which research projects can be grounded in equitable partnerships and the co-production of geographical knowledge. In building a learning culture that takes translation seriously we seek to contribute with transparency and integrity to geographical enquiry. As collaborators, co-authors and co-producers of this El Niño learning experience, we have all come to understand that, as we collectively address the urgent agendas of our climate-challenged times, school students can be so much more than an audience, a source of data or targets of and for development.

## Notes

1. AHRC 2019–2022 ‘Fishing and farming in the desert?’ A platform for understanding El Niño food system opportunities in the context of climate change in Sechura, Peru’ - AH/T004444/1AH.

- 2021-2022: El Niño a phenomenon with opportunities: learning history and valuing community assets for an empowering digital curriculum in northern Peru AH/V012215/1. For more details see: <https://elninophenomenon.wp.st-andrews.ac.uk>
2. Sechura is located on the north coast of Peru, in the region of Piura and is deeply linked to the El Niño phenomenon - its main economic activities are fishing, farming and lately phosphate mining.
  3. St Andrews is located in Fife.
  4. These were peppered through with concerns about stranded researchers and the growing numbers of Peruvian colleagues, friends and project collaborators who became sick and lost their lives as the pandemic continued to gain a hold in Peru.
  5. The word 'feminist' appears once in a cited reference (England K (1994). Getting personal: Reflexivity, positionality, and feminist research. *The Professional Geographer* 46: 80–89.) in the first review 'Qualitative methods I: On current conventions in interview research' (Hitchings & Latham, 2019).
  6. In a first pilot phase of the project, conducted under full lockdown, 10 students drawn from first and second year of secondary school participated. In the second phase, the programme was extended to 32 third year students and a further 36 in second year.
  7. Alongside participating in oral history interviews, parents also took part in a series of parent-teacher association sessions that explained the research project and curriculum activities and at a later date their outcomes.
  8. Action learning sets are one approach that can be used to foster learning in the workplace. They have been used by a number of organisations in the NGO sector in recent years. The emphasis is on learning from experience and then acting on that learning (Bond, 2004).
  9. *Educational Innovation Projects National Competition*, Fondo Nacional de Desarrollo de la Educación Peruana (FONDEP), Ministerio de Educación, Peru. One of 625 winners from among 1666 applicants nationally 10/5/22 <https://fondep.gob.pe/red/storage/app/media/concursos/cnpie2022/CNPIE2022-lista-de-proyectos-ganadores.pdf> (Page 32).  
2020 National Contest of *Educational Innovation Projects National Competition*, Fondo Nacional de Desarrollo de la Educación Peruana, (FONDEP), Ministerio de Educación, Peru. One of 84 winners from among 1332 applicants nationally 16/12/20 [https://www.fondep.gob.pe/wp-content/uploads/2020/12/151220\\_CNPIE-2020-LISTA-GANADORES-SEPARADO.pdf](https://www.fondep.gob.pe/wp-content/uploads/2020/12/151220_CNPIE-2020-LISTA-GANADORES-SEPARADO.pdf) (Page 5).
  10. 2021-2022: El Niño a phenomenon with opportunities: learning history and valuing community assets for an empowering digital curriculum in northern Peru AH/V012215/1.
  11. Peruvian national '*Ciudadanos al Día*' (*Today's Citizen's*) awards for best practice in public policy. One of 188 winners across 21 categories from 3659 private and public institution applicants, and one of the 3 finalists in the category of promoting culture and identity. 10/8/22. <https://premiobpg.pe/wp-content/uploads/PUBLICACION-PREMIOS-2022-PDF-interactivo-VF.pdf> (page 26).
  12. <https://www.rgs.org/schools/resources-for-schools/el-nino-phenomenon-of-opportunities>.
  13. *Red de investigadores de las nuevas especies en pesca y cultivos del desierto de Sechura* (REN-DINEPC) (Network of those investigating the new species of fish and crops in the Sechura Desert). <https://sites.google.com/ugelsechura.edu.pe/proyectedeinnovacinredinepc/inicio>.

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